

What is claimed is:

1. A thin-film magnetic head comprising:

a medium facing surface that faces toward a recording medium;

a reproducing head including: a magnetoresistive element; and a first shield layer and a second shield layer for shielding the magnetoresistive element, portions of the shield layers located on a side of the medium facing surface being opposed to each other with the magnetoresistive element in between; and

a recording head including: a first magnetic layer and a second magnetic layer magnetically coupled to each other and including magnetic pole portions opposed to each other and placed in regions of the magnetic layers on a side of the medium facing surface, each of the magnetic layers including at least one layer; a gap layer provided between the pole portion of the first magnetic layer and the pole portion of the second magnetic layer; and a thin-film coil at least a part of which is placed between the first and second magnetic layers, the at least part of the coil being insulated from the first and second magnetic layers, wherein:

the first magnetic layer includes: a first portion located in a region facing toward the at least part of the thin-film coil; and a second portion including the pole portion of the first magnetic layer and connected to a surface of the first portion facing toward the thin-film coil;

the second portion further includes: a center portion that defines a throat height; and side portions formed at both ends of a width of the center portion, the side portions each having a length between an end thereof

located in the medium facing surface and the other end, the length being greater than a length of the center portion between an end thereof located in the medium facing surface and the other end;

the length of the center portion between the end thereof located in the medium facing surface and the other end is greater than a length of the magnetoresistive element between an end thereof located in the medium facing surface and the other end;

the at least part of the thin-film coil is located on a side of the second portion of the first magnetic layer; and

the second magnetic layer defines a track width.

2. The thin-film magnetic head according to claim 1, wherein a width of the second magnetic layer measured in a position corresponding to the other end of the center portion is greater than a width of the second magnetic layer measured in the medium facing surface.

3. The thin-film magnetic head according to claim 2, wherein the second magnetic layer includes: a portion having a width equal to the track width and located closer to the medium facing surface than the other portion of the second magnetic layer; and the other portion having a width greater than the track width, the width of the other portion decreasing toward the medium facing surface.

4. The thin-film magnetic head according to claim 1, wherein the length of the center portion between the end thereof located in the medium facing surface and the other end is 150 to 600 percent of the length of the magnetoresistive element between the end thereof located in the medium facing surface and the other end.

5. The thin-film magnetic head according to claim 1, wherein the length of the center portion between the end thereof located in the medium facing surface and the other end is 300 to 500 percent of the length of the magnetoresistive element between the end thereof located in the medium facing surface and the other end.

6. The thin-film magnetic head according to claim 1, further comprising an insulating layer that covers the at least part of the thin-film coil located on the side of the second portion of the first magnetic layer, wherein a surface of the insulating layer facing toward the second magnetic layer is flattened together with a surface of the second portion facing toward the second magnetic layer.

7. The thin-film magnetic head according to claim 1, wherein the second magnetic layer is made up of one layer.

8. The thin-film magnetic head according to claim 1, wherein the second magnetic layer includes: a pole portion layer including the pole

portion of the second magnetic layer, the pole portion defining the track width; and a yoke portion layer forming a yoke portion and connected to the pole portion layer.

9. The thin-film magnetic head according to claim 8, wherein an end face of the yoke portion layer facing toward the medium facing surface is located at a distance from the medium facing surface.

10. The thin-film magnetic head according to claim 9, wherein: the pole portion layer has a length between an end thereof located in the medium facing surface and the other end, the length being greater than the length of the magnetoresistive element between the end thereof located in the medium facing surface and the other end; and the distance between the medium facing surface and the end face of the yoke portion layer facing toward the medium facing surface is equal to or greater than the length of the magnetoresistive element.

11. The thin-film magnetic head according to claim 8, wherein the thin-film coil includes: a first layer located on a side of the second portion of the first magnetic layer; and a second layer located on a side of the pole portion layer of the second magnetic layer.

12. The thin-film magnetic head according to claim 11, further comprising: a first insulating layer that covers the first layer of the coil and has a surface facing toward the second magnetic layer, the surface being flattened together with a surface of the second portion of the first magnetic layer facing toward the second magnetic layer; and a second insulating layer that covers the second layer of the coil and has a surface facing toward the yoke portion layer, the surface being flattened together with a surface of the pole portion layer of the second magnetic layer facing toward the yoke portion layer.

13. The thin-film magnetic head according to claim 1, wherein the other end of the center portion has a shape of a straight line parallel to the medium facing surface.

14. The thin-film magnetic head according to claim 1, wherein the second portion of the first magnetic layer surrounds the at least part of the thin-film coil.

15. A method of manufacturing a thin-film magnetic head comprising:  
a medium facing surface that faces toward a recording medium;  
a reproducing head including: a magnetoresistive element; and a first shield layer and a second shield layer for shielding the magnetoresistive element, portions of the shield layers located on a side of the medium facing

surface being opposed to each other with the magnetoresistive element in between; and

a recording head including: a first magnetic layer and a second magnetic layer magnetically coupled to each other and including magnetic pole portions opposed to each other and placed in regions of the magnetic layers on a side of the medium facing surface, each of the magnetic layers including at least one layer; a gap layer provided between the pole portion of the first magnetic layer and the pole portion of the second magnetic layer; and a thin-film coil at least a part of which is placed between the first and second magnetic layers, the at least part of the coil being insulated from the first and second magnetic layers,

wherein the second magnetic layer defines a track width, the method including the steps of:

forming the reproducing head;

forming the first magnetic layer;

forming the gap layer on the first magnetic layer;

forming the second magnetic layer on the gap layer; and

forming the thin-film coil such that the at least part of the coil is placed between the first and second magnetic layers, the at least part of the coil being insulated from the first and second magnetic layers, wherein:

the step of forming the first magnetic layer includes formation of: a first portion located in a region facing toward the at least part of the thin-film coil; and a second portion including the pole portion of the first

magnetic layer and connected to a surface of the first portion facing toward the thin-film coil;

the second portion is formed to further include: a center portion that defines a throat height; and side portions formed at both ends of a width of the center portion, the side portions each having a length between an end thereof located in the medium facing surface and the other end, the length being greater than a length of the center portion between an end thereof located in the medium facing surface and the other end;

the length of the center portion between the end thereof located in the medium facing surface and the other end is made greater than a length of the magnetoresistive element between an end thereof located in the medium facing surface and the other end in the step of forming the first magnetic layer; and

the at least part of the thin-film coil is located on a side of the second portion of the first magnetic layer in the step of forming the coil.

16. The method according to claim 15, wherein, in the step of forming the second magnetic layer, a width of the second magnetic layer measured in a position corresponding to the other end of the center portion is made greater than a width of the second magnetic layer measured in the medium facing surface.

17. The method according to claim 16, wherein the step of forming the second magnetic layer includes formation of: a portion having a width equal

to the track width and located closer to the medium facing surface than the other portion of the second magnetic layer; and the other portion having a width greater than the track width, the width of the other portion decreasing toward the medium facing surface.

18. The method according to claim 15, wherein, in the step of forming the first magnetic layer, the length of the center portion between the end thereof located in the medium facing surface and the other end is made to be 150 to 600 percent of the length of the magnetoresistive element between the end thereof located in the medium facing surface and the other end.

19. The method according to claim 15, wherein, in the step of forming the first magnetic layer, the length of the center portion between the end thereof located in the medium facing surface and the other end is made to be 300 to 500 percent of the length of the magnetoresistive element between the end thereof located in the medium facing surface and the other end.

20. The method according to claim 15, further including the step of forming an insulating layer that covers the at least part of the thin-film coil located on the side of the second portion of the first magnetic layer, wherein a surface of the insulating layer facing toward the second magnetic layer is flattened together with a surface of the second portion facing toward the second magnetic layer.



21. The method according to claim 15, wherein the second magnetic layer is made up of one layer.

22. The method according to claim 15, wherein the step of forming the second magnetic layer includes formation of: a pole portion layer including the pole portion of the second magnetic layer, the pole portion defining the track width; and a yoke portion layer forming a yoke portion and connected to the pole portion layer.

23. The method according to claim 22, wherein, in the step of forming the second magnetic layer, an end face of the yoke portion layer facing toward the medium facing surface is located at a distance from the medium facing surface.

24. The method according to claim 23, wherein, in the step of forming the second magnetic layer, the pole portion layer is made to have a length between an end thereof located in the medium facing surface and the other end, the length being greater than the length of the magnetoresistive element between the end thereof located in the medium facing surface and the other end; and the distance between the medium facing surface and the end face of the yoke portion layer facing toward the medium facing surface is made equal to or greater than the length of the magnetoresistive element.

25. The method according to claim 22, wherein the step of forming the thin-film coil includes formation of: a first layer located on a side of the second portion of the first magnetic layer; and a second layer located on a side of the pole portion layer of the second magnetic layer.

26. The method according to claim 25, further including the steps of: forming a first insulating layer that covers the first layer of the coil and has a surface facing toward the second magnetic layer, the surface being flattened together with a surface of the second portion of the first magnetic layer facing toward the second magnetic layer; and forming a second insulating layer that covers the second layer of the coil and has a surface facing toward the yoke portion layer, the surface being flattened together with a surface of the pole portion layer of the second magnetic layer facing toward the yoke portion layer.

27. The method according to claim 15, wherein, in the step of forming the first magnetic layer, the other end of the center portion is made to have a shape of a straight line parallel to the medium facing surface.

28. The method according to claim 15, wherein the second portion of the first magnetic layer is formed to surround the at least part of the thin-film coil in the step of forming the first magnetic layer.